sources, respectively, and wherein the plurality of current sources comprises four current mirrors.

REMARKS

Claims 1, 4-14, and 17-30 are pending in the present application. Reconsideration of the claims is respectfully requested.

I. 35 U.S.C. § 112, First Paragraph

The specification was objected to under 35 U.S.C. § 112, first paragraph, as failing to adequately teach how to make and/or use the circuit shown in Figure 2. Additionally, claims 1, 4-14, and 17-30 were rejected for the same reason. This rejection is respectfully traversed.

The Office Action states:

> Line 5 of page 7 of the specification states that "V_T is the absolute value of the threshold voltage." This statement is not at all understood because nowhere does it state what in particular this is the "threshold" of. Similarly, line 6 does not states what element "V_{BE}" is the base-emitter voltage of. In addition, lines 8 and 9 do not state what element or elements "q" is the electronic charge of.

Paper No. 13, page 2 (emphasis in original). The voltages V_T and V_{BE} are defined in the specification at page 10: "The voltage V_T is set up by transistor **M9**, while resistor R_3 sets up the current. The voltage drop across R_3 is V_T." Specification, page 10, lines 25-27. "The voltage V_{BE} is set up by transistor **B3** and resistor R_2 sets up the current; the voltage drop across R_2 is V_{BE}." Specification, page 10, lines 10-12. The electronic charge "q" is well-known constant, the charge of a single electron determined by Milikan in 1909 and having a value of approximately 1.6×10^{-19} C. See Runyan et al, *Semiconductor Integrated Circuit Processing Technology*, (Addison-Wesley Publishing Co. 1990), Appendix C, Table C.1 (copy attached).

The Office Action further states:

> Also, with respect to equation 1, it does not appear that constants K_1-K_3 are correctly stated. Line 25 of page 7 states that "constants K_1-K_3 from equation (1) may be set by resistors and scaled transistors in the current mirrors." From this it would appear that it is necessary that there be at least four (4) constant

terms (i.e. K_1-K_4) corresponding to specific resistor values R_1-R_4.

Paper No. 13, page 2 (emphasis in original). The Examiner's supposition is incorrect. The constants K_1-K_3 are described as being related to the resistors, and the circuit includes four resistors. However, it does not follow that at least four constants are required. Not all of the resistors are significant to the current generated by the current sources in the circuit disclosed. In particular, note that resistor R_4 is located in the ground path of current mirror D, not in the path of the current mirror's reference current as is the case of resistors R_1-R_3. Until the Examiner advances a better mathematical rationale than a conviction that there must be symmetry between the number of constants in an equation and the number of resistors in a circuit, Applicant is unable to perceive any error in equation (1).

The Office Action further states: "From line 20, equation 3, it appears that the term 'K_2V_{BE}' in equation 1 should be changed to --K_2V_{BE}/q--." Paper No. 13, page 2. As noted above "q" is the well-known <u>constant</u> for electronic charge (not a variable) and accordingly may be absorbed into the constant K_2.

Finally, the Office Action states: "In addition, equations 2-5 are not clearly understood because the symbol '$\propto$' is not recognized, thus, it is not clear what the equations are stating." In fact, the symbol "$\propto$" is a well-known mathematical symbol meaning "is proportional to" which is frequently used in the analysis of transistors and transistor circuits, particularly to describe currents. See, e.g., Yang, *Microelectronic Devices* (McGraw Hill Book Co. 1988), page 125 equation (5-29).

Therefore, the objection to the specification and rejection of claims 1, 4-14, and 17-30 under 35 U.S.C. § 112, first paragraph has been overcome.

II. <u>35 U.S.C. § 112, Second Paragraph</u>

Claims 1, 4-14, and 17-30 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. This rejection is

respectfully traversed.

Claims 1, 4, 14, and 17 have been amended to clarify the relationship of the bandgap equation to the physical components recited. No new matter is added. The specification indicates that V_T is set up by transistor **M9** in current mirror **C** while V_{BE} is set up by transistor **B3** in current mirror **B**. Specification, page 10, lines 10-11, 25-26. In the specification, temperature T in the bandgap equation is a multiplier of the constant K_3, which, as described below, relates to transistor **T1** in current mirror **A**. Specification, page 7, line 4. Constant K_1 is defined in the specification as a function of resistor R_3 and transistor **T3** in current mirror **C**. Specification, page 11, lines 9-16. Constant K_2 is defined in the specification as a function of resistor R_2 and transistor **T2** in current mirror **B**. Specification, page 10, lines 9-18. Constant K_3 is defined in the specification as a function resistor R_1 and transistor **T1** in current mirror **A**. Specification, page 9, lines 5-14.

Therefore, the rejection of claims 1, 4-14, and 17-30 under 35 U.S.C. § 112, second paragraph has been overcome.

III. **35 U.S.C. § 102, Anticipation**

Claims 1, 14, 27 and 28 were rejected under 35 U.S.C. § 102 as being anticipated by *Bingham*. This rejection is respectfully traversed.

A prior art reference anticipates the claimed invention under 35 U.S.C. § 102 if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990). There is no indication or suggestion that the current sources 110 and 116 of *Bingham* supply current according to the bandgap equation recited in Applicant's independent claims. Therefore *Bingham* does not anticipate the claimed invention.

Therefore, the rejection of claims 1, 14, 27 and 28 under 35 U.S.C. § 102 has been overcome.
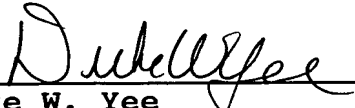
IV. **Conclusion**

It is respectfully urged that the subject application is patentable over *Bingham* and is now in condition for allowance.

The examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

DATE: November 7, 1996   Respectfully submitted,

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